Author Index to Volume XXII

Adachi, S., Hashimoto, K., Matsuno, R., Nakanishi, K., Kamikubo, T.: Pulse Response in an Immobilized-Enzyme Column: Theoretical Method for Predicting Elution Curves, 779

Ademola, J. I., and Hutchinson, D. W.: Preparation and Properties of an Insolubilized Phosphotransferase, 2419

Adu-Amankwa, B.: See Constantinides, A.

Aizawa, M. M., Wada, M., Kato, S., and Suzuki, S.: Immobilized Mitochondrial Electron Transport Particle for NADH Determination, 1769

Albanesi, D.: See Greco, Jr., G.

Anderson, A. W.: See Chen, W. P.

Anthony, W. B.: See Samuel, W. A.

Areson, P. D. W., Charm, S. E., and Wong, B. L.: Human Antibody Immunosorption of Hepatitis B Surface Antigen from Blood and Plasma, 2207

Austic, R. E.: See Kargi, F.

Bagley, E. B.: See Silman, R. W.

Bailey, J. E.: See Fazel-Madjlessi, J.

Bajracharya, R., and Mudgett, R. E.: Effects of Controlled Gas Environments in Solid-Substrate Fermentations of Rice, 2219

Bandyopadhyay, K. K.: See Ghose, T. K.

Baratti, J.: See Couderc, R.

Baroon, Z. H.: See Hamer, G.

Baskir, C. I., and Hansford, G. S.: Product Formation in the Continuous Culture of Microbial Populations Grown on Carbohydrates, 1857

Battley, E. H., and DiBiase, G.: Convenient Method of Preparing Microbial Cells for Bomb Calorimetry, 2417

Bazin, M. J.: See Pickett, A. M.

Beardmore, D. H.: See Fan, L. T.

Beccari, M., Mappelli, P., and Tandoi, V.: Relationship between Bulking and Physicochemical–Biological Properties of Activated Sludges, 969

Beddows, C. G., Mirauer, R. A., and Guthrie, J. T.: Immobilization of β-Galactosidase and Other Enzymes onto *p*-Amino-Carbanilated Cellulose Derivatives, 311

Bell, R. L.: See Young, M. E.

Beltrame, P., Beltrame, P. L., and Carniti, P.: Use of the Haldane Equation for Steady-State Substrate Inhibition in Biodegradation Kinetics, 2405

Beltrame, P. L.: See Beltrame, P.

Beneš, P.: See Linek, V.

Berezin, I. V.: See Martinek, K.

Berry, V. K., and Murr, L. E.: Morphological and Ultrastructural Study of the Cell Envelope of Thermophilic and Acidophilic Microorganisms as Compared to *Thiobacillus ferroxidans*, 2543

Bhatia, M., and Prabhu, K. A.: Production of High-Fructose Syrup by a Heat-Fixed *Lactobacillus* sp., 1957

Bhattacharya, P.: See Mukherjea, R. N.

Bhuwapathanapun, S.: See Gray, P. P.

Black, L. T.: See Silman, R. W.

Bohmfalk, G. T.: See Shieh, T. R.

Bohnenkamp, C. G., and Reilly, P. J.: Use of Immobilized Glucoamylase–β-Amylase and Glucoamylase–Fungal Amylase Mixtures to Produce High-Maltose Syrups, 1753

Borzani, W., Vairo, M. L. R., Perego, Jr., L., Koshimizu, L. H., de Melo Cruz, M. R., and de Souza Dias, J. M. C.: Response of a Continuous Culture of *Saccharomyces cerevisiae* to Variation of Temperature, 231

Bose, S. M.: See Puvanakrishnan, R.

Bostick, W. D., and Overton, J. B.: Modified Kit Procedure for the Kinetic Assay of Ethanol, 2383

——, and Burtis, C. A.: Hydroxylamine as a Competitive Inhibitor for the Kinetic Enzymatic Assay of Ethanol in Relatively Concentrated Solutions, 2437

Bourne, J. R.: See Ziegler, H.

Bowden, M. W.: See Stutzenberger, F. J.
Bowen, J. D.: See Sae, A. S. W.
Boze, H.: See Moulin, G.
Brazzach, M. L.: See Ujikawa, K.
Brooks, W. M.: Production and Efficacy of Protozoa, 1415
Buäuhler, H.: See Puhar, E.
Bu'Lock, J. D.: See Kristiansen, B.
Burtis, C. A.: See Botick, W. D.
Butler, L. G.: See Kelley, S. J.

Cabeca-Silva, C.: See van Uden, N.
Cadman, T. W.: See Wilder, C. T.
Cantarella, M.: See Greco, Jr., G.
Carbonell, R. G.: See Chang, C-T.
Carlberg, G.: See Holmberg, A.
Carleysmith, S. W., Dunnill, P., and Lilly, M. D.: Kinetic Behavior of Immobilized Penicillin Acylase, 735
——, Eames, M. B. L., and Lilly, M. D.: Staining Method for Determination of the Penetration of Immobilized Enzyme into a Porous Support, 957
Carniti, P.: See Beltrame, P.
Carroad, P. A.: See Young, M. E.
Castanon, M., and Wilke, C. R.: Adsorption and Recovery of Cellulases during Hydrolysis of Newspaper, 1037
Chang, C-T., McCoy, B. J., and Carbonell, R. G.: Hydrophobic Chromatography of β-Galactosidase, 377
Chapman, C. M., Nienow, A. W., and Middleton, J. C.: Surface Aeration in a Small, Agitated, and Sparged Vessel, 981
Charm, S. T.: See Areson, P. D. W.
Chen, L. F.: See Gong, C-S.
Chen, W. P., and Anderson, A. W.: Extraction of Hemicellulose from Ryegrass Straw for the Production of Glucose Isomerase and Use of the Resulting Straw Residue for Animal Feed, 519
Chen, Y. R., and Hashimoto, A. G.: Substrate Utilization Kinetic Model for Biological Treatment Processes, 2081
Chibata, I.: See Wada, M.
——: See Yamamoto, K.
Chun, M.: See Hannibal-Friedrich, O.
Clifford, C., and Johnson, D. B.: Immobilization of β-Glucuronidase on Inorganic Supports, 2441
Constantinides, A.: Steroid Transformation at High Substrate Concentrations Using Immobilized *Corynebacterium simplex* Cells, 119
——, and Adu-Amankwa, B.: Enzymatic Modification of Vegetable Protein: Mechanism, Kinetics, and Production of Soluble and Partially Soluble Protein in a Batch Reactor, 1543
Converse, A.: See Knappert, D.
Couderc, R., and Baratti, J.: Immobilized Yeast Cells with Methanol Oxidase Activity: Preparation and Enzymatic Properties, 1155
Couch, T. L., and Ross, D. A.: Production and Utilization of *Bacillus thuringiensis*, 1297
Cremonesi, P.: See D'Angiuro, L.

Da Costa, M. B., and van Uden, N.: Use of 2-Deoxyglucose in the Selective Isolation of Mutants of *Trichoderma reesei* with Enhanced β-Glucosidase Production, 2429
D'Angiuro, L., Cremonesi, P., Mazzola, G., Focher, B., and Vecchio, G.: Preparation and Characterization of Enzymes Immobilized by Graft Copolymerization to Different Polysaccharides, 2251
Dawson, P. S. S., and Steinhauer, L. P.: Dynamic Aspects of Radiorespirometry during the Cell Cycle of *Candida utilis:* Some Observations in Phased Culture under Carbon-, Nitrogen-, and Phosphorus-Limited Growth, 137
de Kok, H. E.: See Geurts, Th. G. E.
——, and Roels, J. A.: Method for the Statistical Treatment of Elemental and Energy Balances with Application to Steady-State Continuous-Culture Growth of *Saccharomyces cerevisiae* CBS 426 in the Respiratory Region, 1097
de Melo Cruz, M. R.: See Borzani, W.
DeNicola, K., and Kirwan, D. J.: Adsorption Isotherms of *Azotobacter vinelandi* on Cellex E, 1283
de Souza Dias, J. M. C.: See Borzani, W.
de Zeeuw, W.: See Lettinga, G.
Dhawan, S.: See Vohra, R. M.
DiBiase, G.: See Battley, E. H.
Do, D. D., and Weiland, R. H.: Consistency between Rate Expressions for Enzyme Reactions and Deactivation, 1087
Dougall, D. K., and Weyrauch, K. W.: Growth and Anthocyanin Production by

Carrot Suspension Cultures Grown under Chemostat Conditions with Phosphate as the Limiting Nutrient, 337
Drozd, J. W., and Wren, S. J.: Growth Energetics in the Production of Bacterial Single Cell Protein from Methanol, 353
D'Souza, S. F., and Nadkarni, G. B.: Continuous Conversion of Sucrose to Fructose and Gluconic Acid by Immobilized Yeast Cell Multienzyme Complex, 2179
——, and ——: Immobilized Catalase-Containing Yeast Cells: Preparation and Enzymatic Properties, 2191
Dunn, I. J.: See Ziegler, H.
Dunnill, P.: See Carleysmith, S. W.
——: See Hanisch, W. H.

Eames, M. B. L.: See Carleysmith, S. W.
Effland, M. J.: See Yang, H. H.
Einsele, A.: See Puhar, E.
Ek, M., and Eriksson, K.-E.: Utilization of the White-Rot Fungus *Sporotrichum pulverulentum* for Water Purification and Protein Production on Mixed Lignocellulosic Wastewaters, 2273
Engler, R., and Rogoff, M. H.: Registration and Regulation of Microbial Pesticides, 1441
Erdem, H.: See Girard, H. C.
Erickson, L. E.: Biomass Elemental Composition and Energy Content, 451
——: Oxygen Uptake of *Trichoderma reesei*, 693
——: Analysis of Microbial Growth and Product Formation with Nitrate as Nitrogen Source, 1929
——: See Ferrer, A.
——: See Viesturs, U. E.
Eriksson, K-E., Grünewald, A., and Vallander, L.: Studies of Growth Conditions in Wood for Three White-Rot Fungi and Their Cellulaseless Mutants, 363
——: See Ek, M.
Eriksson, S.: See Thomke, S.
Ersson, B.: Large-Scale Preparation of a Lectin from Sunn Hemp Seeds (*Crotalaria juncea*), 79
Esener, A. A., Kossen, N. W. F., and Roels, J. A.: Carbon Dioxide Hold-Up as a Source of Error in Batch-Culture Calculations, 1979

Fan, L. T., Lee, Y-H., Beardmore, D. H.: Mechanism of the Enzymatic Hydrolysis of Cellulose: Effects of Major Structural Features of Cellulose on Enzymatic Hydrolysis, 177
Fathi-Afshar, S., and Rudd, D. F.: Biomass Ethanol as a Chemical Feedstock in the United States, 677
Fazel-Madjlessi, J., and Bailey, J. E.: Analysis of Fermentation Processes Using Flow Microfluorometry: Amylase and Protease Activities in *Bacillis subtilis* Batch Cultures, 1657
——, ——, and McQuitty, D. N.: Flow Microfluorometry Measurements of Multicomponent Cell Composition during Batch Bacterial Growth, 457
Fencl, Z.: See Ujcová, E.
Ferchak, J. D., Hägerdal, B., and Pye, E. K.: Saccharification of Cellulose by the Cellulolytic Enzyme System of *Thermomonospora* sp. II. Hydrolysis of Cellulosic Substrates, 1527
——: See Hägerdal, B.
Ferrer, A., and Erickson, L. E.: Data Consistency, Yield, Maintenance, and Hysteresis in Batch Cultures of *Candida lipolytica* Cultured on *n*-Hexadecane, 421
Fiechter, A.: See Käppeli, O.
Finnerty, W. R.: See Käppeli, O.
Flickinger, M. C., Jansen, N. B., and Forrest, E. H.: Mobile Self-Contained Off-Gas Analysis Units for Fermentation Pilot Plants, 1273
Focher, B.: See D'Angiuro, L.
Forrest, E. H.: See Flickinger, M. C.
Franks, P. A., Hall, R. J., and Linklater, P. M.: Mechanistic Model of the Growth of *Streptococcus cremoris* HP at Superoptimal Temperatures, 1465

Gaddy, J. L.: See Sitton, O. C.
Galzy, P.: See Moulin, G.
Gangopadhyay, T.: See Mukherjea, R. N.
Garver, J. C.: See Lamb, S. C.
Ghose, T. K., and Bandyopadhyay, K. K.: Rapid Ethanol Fermentation in Immobilized Yeast Cell Reactor, 1489
——: See Tyagi, R. D.
Ghosh, B. K.: See Mukherjea, R. N.
Girard, H. C., Sütcü, M., Erdem, H., and Gürhan, I.: Monolayer Cultures of Animal Cells with the Gyrogen Equipped

with Tubes, 477
Gondo, S., Morishita, M., and Osaki, T.: Improvement of Glucose Sensor Performance with Immobilized Glucose Oxidase—Glucose Isomerase System, 1287
Gong, C-S., Chen, L. F., and Tsao, G. T.: Purification and Properties of Glucose Isomerase of *Antinoplanes missouriensis*, 833
——: See Hsu, T-A.
——: See Ladisch, M. R.
Granados, R. R.: Infectivity and Mode of Action of Baculoviruses, 1357
Gray, P. P., and Bhuwapathanapun, S.: Production of the Macrolide Antibiotic Tylosin in Batch and Chemostat Cultures, 1785
Greco, Jr., G., Albanesi, D., Cantarella, M., and Scardi, V.: Experimental Technique for Multilayer Enzyme Immobilization, 215
Grethlein, H.: See Knappert, D.
Grm, B., Mele, M., and Kremser, M.: Model of Growth and Ergot Alkaloid Production by *Claviceps purpurea*, 255
Grünewald, A.: See Eriksson, K-E.
Guerts, Th. G. E., de Kok, H. E., and Roels, J. A.: A Quantitative Description of the Growth of *Saccharomyces cerevisiae* CBS 426 on a Mixed Substrate of Glucose and Ethanol, 2031
Guillaume, M.: See Moulin, G.
Gupta, K. G.: See Vohra, R. M.
Gürhan, I.: See Girard, H. C.
Guthrie, J. T.: See Beddows, C. G.

Hägerdal, B., Ferchak, J. D., and Pye, E. K.: Saccharification of Cellulose by the Cellulolytic Enzyme System of *Thermomonospora* sp. I. Stability of Cellulolytic Activities with Respect to Time, Temperature, and pH, 1515
——: See Ferchak, J. D.
Hall, R. J.: See Franks, P. A.
Hamdan, I. Y.: See Hamer, G.
Hamer, G., Hamdan, I. Y., Khamis, A. S., and Baroon, Z. H.: Problems Concerning the Operation of High Productivity Biomass Fermentations Using Volatile Liquid Hydrocarbon Feedstocks, 995
Hanisch, W. H., Dunnill, P., and Lilly, M. D.: Optimization of the Production of Progesterone 11-α-Hydroxylase by *Rhizopus nigricans*, 555
Hannibal-Friederich, O., Chun, M., and Sernetz, M.: Immobilization of β-Galactosidase, Albumin, and γ-Globulin on Epoxy-Activated Acrylic Beads, 157
Hansford, G. S.: See Baskir, C. I.
Harano, Y.: See Ooshima, H.
Harima, T., and Humphrey, A. E.: Estimation of *Trichoderma* QM 9414 Biomass and Growth Rate by Indirect Means, 821
Hashimoto, A. G.: See Chen, Y. R.
Hashimoto, K.: See Adachi, S.
Hatch, R. T.: See Wilder, C. T.
Heijnen, J. H., Van't Riet, K., and Wolthuis, A. J.: Influence of Very Small Bubbles on the Dynamic k_LA Measurement in Viscous Gas–Liquid Systems, 1945
Heijnen, J. J.: See Roels, J. A.
Henry, A.: See Kargi, F.
Herr, D.: Conversion of Cellulose to Glucose with Cellulase of *Trichoderma viride* ITCC-1433, 1601
Hillen, L. W.: See Wake, L. V.
Hobma, S. W.: See Lettinga, G.
Holeček, O.: See Linek, V.
Holmberg, A., Sievänen, R., and Carlberg, G.: Fermentation of *Bacillus thuringiensis* for Exotoxin Production: Process Analysis Study, 1707
Hospodka, J.: See Rhee, D. K.
——: See Ryu, D. D. Y.
Hotogi, S.: See Kitano, H.
Hsu, T-A., Gong, C-S., and Tsao, G. T.: Kinetic Studies of Cellodextrins Hydrolyses by Exocellulase from *Trichoderma reesei*, 2305
Huang, H. T.: Introduction, 1295
Hultin, H. O.: See Wasserman, B. P.
Humphrey, A. E.: See Harima, T.
Hung, Y. T.: See Wu, Y. C.
Hutchinson, D. W.: See Ademola, J. I.

Ibrahim, M., and Schlegel, H. G.: Oxygen Supply to Bacterial Suspensions of High Cell Densities by Hydrogen Peroxide, 1877
——, and ——: Efficiency of Bovine Liver Catalase as a Catalyst to Cleave H_2O_2 Added Continually to Buffer Solutions, 1895
Ingold, W.: See Puhar, E.

Ise, N.: See Kitano, H.

Jacobson, B. S.: See Wasserman, B. P.
Jansen, N. B.: See Flickinger, M. C.
Jenkins, D.: See Koopman, B.
Johnson, D. B.: See Clifford, C.
Jorgenson, G.: See Lovrien, R.

Kaboli, H., and Reilly, P. J.: Immobilization and Properties of *Leuconostoc mesenteroides* Dextransucrase, 1055
Kadziauskiene, K.: See Kulys, J.
Kamikubo, T.: See Adachi, S.
Käppeli, O., and Fiechter, A.: Biological Method for the Measurement of the Maximum of the Maximum Oxygen Transfer Rate of a Bioreactor at Definite Conditions, 1509
——, and ——: Partition of Hexadecane to the Cell Surface of *Candida tropicalis:* Mechanism for the Transport of Water-Insoluble Subtrates, 1829
——, and Finnerty, W. R.: Characteristics of Hexadecane Partition by the Growth Medium of *Acinetobacter* sp., 495
Karanth, N. G., and Manchanda, A. C.: Useful Sparger Arrangement for Fermentations Involving Heavy Mycelial Suspensions, 1985
Kargi, F., Shuler, M. L., Vashon, R., Seeley, H. W., Henry, A., and Austic, R. E.: Continuous Aerobic Conversion of Poultry Waste into Single-Cell Protein Using a Single Reactor. Kinetic Analysis and Determination of Optimal Conditions, 1567
Karube, I., Kuriyama, S., Matsunaga, T., and Suzuki, S.: Methane Production from Wastewaters by Immobilized Methanogenic Bacteria, 847
——, Otsuka, T., Kayano, H., Matsunaga, T., and Suzuki, S.: Photochemical System for Regenerating NADPH from NADP with Use of Immobilized Chloroplasts, 2655
——: See Matsumoto, K.
——: See Matsunaga, T.
——: See Morikawa, Y.
Kato, J.: See Wada, M.
Kato, S.: See Aizawa, M. M.
Katoh, S.: See Sada, E.
Kayano, H.: See Karube, I.
Kelley, S. J., and Butler, L. G.: Enzymatic Approaches to Production of Sucrose from Starch, 1501
Kelsey, R. G., and Shafizadeh, F.: Enhancement of Cellulose Accessibility and Enzymatic Hydrolysis by Simultaneous Wet Milling, 1025
Khamis, A. S.: See Hamer, G.
Kimura, T.: See Tsuchiya, K.
Kirby, K. D., and Mardon, C. J.: Production of Fuel Ethanol by Solid-Phase Fermentation, 2425
Kirk, T. K.: See Yang, H. H.
Kirwan, D. J.: See DeNicola, K.
Kitano, H., Yoshijima, S., and Ise, N.: Kinetic Study of Hollow-Fiber Enzyme Reactor, 2643
——, ——, Hotogi, S., and Ise, N.: Kinetic Study of Membrane Enzyme Reactor, 2633
Kjellén, K. G., and Neujahr, H. Y.: Enzyme Electrode for Phenol, 299
Klapwijk, A.: See Lettinga, G.
Klimek, J., and Ollis, D. F.: Extracellular Microbial Polysaccharides: Kinetics of *Pseudomonas* sp., *Azotobacter vinelandii,* and *Aureobasidium pullulans* Batch Fermentations, 2321
Knappert, D., Grethlein, H., and Converse, A.: Partial Acid Hydrolysis of Cellulsoic Materials as a Pretreatment for Enzymatic Hydrolysis, 1449
Kobayashi, H., and Suzuki, H.: Temperature and pH Dependence of Mold α-Galactosidase, 505
Konecny, J., and Sieber, M.: Continuous Deactylation of Cephalosporins, 2013
Koopman, B., Lau, A. O., Strom, P. F., and Jenkins, D.: Simple Device for Level Control with Subsurface Drawoff in Chemostats, 2433
Koshimizu, L. H.: See Borzani, W.
Kossen, N. W. F.: See Esener, A. A.
——: See Krouwel, P. G.
Kremser, M.: See Grm, B.
Krikis, V. V.: See Viesturs, U. E.
Kristiansen, B., and Bu'Lock, J. D.: Design of a Fast Flow Reactor for Aerobic Treatment of Dilute Waste Streams, 2579
Krouwel, P. G., and Kossen, N. W. F.: Gas Production by Immobilized Microorganisms: Theoretical Approach, 681
Kuan, K. N., Lee, Y. Y., and Melius, P.:

Ultraviolet-Sensitive Photographic Process Using Enzymes, 1725
Kuhn, H. J.: See Ruhm, K.
Kühn, I.: Alcoholic Fermentation in an Aqueous Two-Phase System, 2393
Kulkarni, B. D., and Ramachandran, P. A.: Criteria for Multiple Steady States in Immobilized-Enzyme Systems, 1759
Kulys, J., and Kadziauskiene, K.: Yeast BOD Sensor, 221
Kuriyama, S.: See Karube, I.

Ladisch, M. R., Gong, C-S., and Tsao, G. T.: Cellobiose Hydrolysis by Endoglucanase (Glucan Glucanohydrolase) from *Trichoderma reesei:* Kinetics and Mechanism, 1107
Lamb, S. C., and Garver, J. C.: Batch- and Continuous-Culture Studies of a Methane-Utilizing Mixed Culture, 2097
——, and ——: Interspecific Interactions in a Methane-Utilizing Mixed Culture, 2119
Lau, A. O.: See Koopman, B.
Lee, C., and Lim, H.: New Device for Continuously Monitoring the Optical Density of Concentrated Microbial Cultures, 639
Lee, D. D., Lee, G. K., Reilly, P. J., and Lee, Y. Y.: Effect of Pore Diffusion Limitation on Dextrin Hydrolysis by Immobilized Glucoamylase, 1
Lee, G. K.: See Lee, D. D.
Lee, S. B.: See Rhee, D. K.
Lee, Y-H.: On Interfacing Different Types of Dissolved Oxygen Probes, 473
——: See Fan, L. T.
Lee, Y. Y.: See Kuan, K. N.
——: See Lee, D. D.
——: See Samuel, W. A.
Lettinga, G., van Velsen, A. F. M., Hobma, S. W., de Zeeuw, W., and Klapwijk, A.: Use of the Upflow Sludge Blanket (USB) Reactor Concept for Biological Wastewater Treatment, Especially for Anaerobic Treatment, 699
Levenspiel, O.: The Monod Equation: A Revisit and a Generalization of Product Inhibition Situations, 1671
Lilly, M. D.: See Carleysmith, S. W.
——: See Hanisch, W. H.
Lim, H.: See Lee, C.
Linek, V., Beneš, P., Sinkule, J., Holeček, O., and Malý, V.: Oxidation of D-Glucose in the Presence of Glucose Oxidase and Catalase, 2515
Linklater, P. M.: See Franks, P. A.
Lovrien, R., Jorgenson, G., Ma, M. K., and Sund, W. E.: Microcalorimetry of Microorganism Metabolism of Monosaccharides and Simple Aromatic Compounds, 1249

Ma, M. K.: See Lovrien, R.
Macy, C.: See Tassinari, T.
Madeira-Lopes, A.: See van Uden, N.
Maiorella, B., and Wilke, C. R.: Energy Requirements for the Vacuferm Process, 1749
Malik, R. K.: See Mukhopadhyay, S. N.
Malý, V.: See Linek, V.
Manchanda, A. C.: See Karanth, N. G.
Mandels, M.: See Reese, E. T.
Mappelli, P.: See Beccari, M.
Mardon, C. J.: See Kirby, K. D.
Martin, W. R. B.: See Ngian, K. F.
Martinek, K., Mozhaev, V. V., Smirnov, M. D., and Berezin, I. V.: Reactivation of "Irreversibly" Denatured Enzymes, 247
Mateles, R. I.: See Merchuk, J. C.
Matsumoto, K., Seijo, H., Karube, I., and Suzuki, S.: Amperometric Determination of Choline with Use of Immobilized Choline Oxidase, 1071
Matsunaga, T., Karube, I., and Suzuki, S.: Some Observations on Immobilized Hydrogen-Producing Bacteria: Behavior of Hydrogen in Gel Membranes, 2607
——: See Karube, I.
Matsuno, R.: See Adachi, S.
Mazzola, G.: See D'Angiuro, L.
McCarty, P. L.: See Rittmann, B. E.
McCoy, B. J.: See Chang, C-T.
McGhee, J. E.: See Silman, R. W.
McQuitty, D. N.: See Fazel-Madjlessi, J.
Mele, M.: See Grm, B.
Melius, P.: See Kuan, K. N.
Merchuk, J. C., Stein, Y., and Mateles, R. I.: Distributed Parameter Model of an Airlift Fermentor, 1189
Middleton, J. C.: See Chapman, C. M.
Minamoto, Y., and Yugari, Y.: Polymethylglutamate as a New Matrix for Covalently Immobilized Enzymes: Preparation and Properties of Urease and Uricase, 1225

Mirauer, R. A.: See Beddows, C. G.
Miura, Y., Tanaka, H., and Okazaki, M.: Stability Analysis of Commensal and Mutual Relations with Competitive Assimilation in Continuous Mixed Culture, 929
——: See Tsuchiya, K.
Miyasaka, Y., Rha, C., and Sinskey, A. J.: Application of Temperature-Sensitive Mutants for Single-Cell Protein Production, 2065
Morikawa, Y., Karube, I., and Suzuki, S.: Continuous Production of Bacitracin by Immobilized Living Whole Cells of *Bacillus* sp., 1015
Morishita, M.: See Gondo, S.
Moulin, G., Boze, H., and Galzy, P.: Inhibition of Alcoholic Fermentation by Substrate and Ethanol, 2375
——, Guillaume, M., and Galzy, P.: Alcohol Production by Yeast in Whey Ultrafiltrate, 1277
Mozhaev, V. V.: See Martinek, K.
Mudgett, R. E.: See Bajracharya, R.
Mukherjea, R. N., Bhattacharya, P., Gangopadhyay, T., and Ghosh, B. K.: Effect of External Mass Transfer on Activation Energy of Hydrolysis of BAEE and Casein by Trypsin Immobilized on Molecular Sieve Type 4A, 543
Mukhopadhyay, S. N., and Malik, R. K.: Increased Production of Cellulase of *Trichoderma* sp. by pH Cycling and Temperature Profiling, 2237
Murr, L. E.: See Berry, V. K.
Musíková, M.: See Ujcová, E.
Muzzarelli, R. A. A., Tanfani, F., and Scarpini, G.: Chelating, Film-Forming, and Coagulating Ability of the Chitosan–Glucan Complex from *Aspergillus niger* Industrial Wastes, 885

Nadkarni, G. B.: See D'Souza, S. F.
Nagai, S.: See Sasaki, K.
Nakanishi, K.: See Adachi, S.
Neujahr, H. Y.: Enzyme Probe for Catechol, 913
——: See Kjellén, K. G.
Ngian, K-F., and Martin, W. R. B.: Biologically Active Fluidized Beds: Mechanistic Considerations, 1007
——, and ——: Bed Expansion Characteristics of Liquid Fluidized Particles with Attached Microbial Growth, 1843
Nickerson, K. W.: Structure and Function of the *Bacillus thuringiensis* Protein Crystal, 1305
Nickle, W. R.: Possible Commercial Formulations of Insect-Parasitic Nematodes, 1407
Nienow, A. W.: See Chapman, C. M.
Nishizawa, Y.: See Sasaki, K.

Oguntimein, G. B., and Reilly, P. J.: Purification and Immobilization of *Aspergillus niger* β-Xylosidase, 1127
——, and ——: Properties of Soluble and Immobilized *Aspergillus niger* β-Xylosidase, 1143
Ohasa, S.: See Yoshida, T.
Ohba, R., and Ueda, S.: Production of Maltose and Maltotriose from Starch and Pullulan by an Immobilized Multienzyme of Pullulanese and β-Amylase, 2137
Okazaki, M.: See Miura, Y.
——: See Tsuchiya, K.
Ollis, D. F.: See Klimek, J.
——: See Thomson, N.
——: See Weiss, R. M.
Ooshima, H., Sakimoto, M., and Harano, Y.: Kinetic Study of Thermal Stability of Immobilized Invertase, 2169
——, ——, and ——: Kinetic Study of Thermal Stability of Immobilized Invertase, 2169
Osaki, T.: See Gondo, S.
Otsuka, T.: See Karube, I.
Overton, J. B.: See Bostick, W. D.

Payne, W. J.: Is the Heat of Combustion of Microbial Cells Predictable Solely from Organic Chemical Bonding? 1095
Perego, Jr., L.: See Borzani, W.
Philipp, M.: See Seliger, H.
Pickett, A. M., Bazin, M. J., and Topiwala, H. H.: Growth and Composition of *Escherichia coli* Subjected to Square-Wave Perturbations in Nutrient Supply: Effect of Varying Amplitudes, 1213
Pimentel, L. S.: Biotechnology Report: The Brazilian Ethanol Program, 1989
Prabhu, K. A.: See Bhatia, M.
Prokopenko, V. D.: See Viesturs, U.E.
Puhar, E., Einsele, A., Buâuhler, H., and

Ingold, W.: Steam-Sterilizable pCO_2 Electrode, 2411
Puvanakrishnan, R., and Bose, S. M.: Studies on the Immobilization of Trypsin on Sand, 919
——, and ——: Properties of Trypsin Immobilized on Sand, 2449
Pye, E. K.: See Ferchak, J. D.
——: See Hägerdal, B.

Ramachandran, P. A.: See Kulkarni, B. D.
Reese, E. T., and Mandel, M.: Stability of the Cellulase of *Trichoderma reesei* under Use Conditions, 323
Reilly, P. J.: See Bohnenkamp, C. G.
——: See Kaboli, H.
——: See Lee, D. D.
——: See Oguntimein, G. B.
Rha, C.: See Miyasaka, Y.
Rhee, D. K., Lee, S. B., Rhee, J. S., Ryu, D. D. Y., and Hospodka, J.: Enzymatic Biosynthesis of Cephalexin, 1237
Rhee, J. S.: See Rhee, D. K.
Rietema, K.: See Verkooyen, A. H. M.
Rittmann, B. E., and McCarty, P. L.: Model of Steady-State Biofilm Kinetics, 2343
——, and ——: Evaluation of Steady-State Biofilm Kinetics, 2359
Roels, J. A.: Simple Model for the Energetics of Growth on Substrates with Different Degrees of Reduction, 33
——: Bioengineering Report: Application of Macroscopic Principles to Microbial Metabolism, 2457
——, and Heijnen, J. J.: Power Dissipation and Heat Production in Bubble Columns: Approach Based on Nonequilibrium Thermodynamics, 2399
——, and Van Suijdam, J. C., Energetic Efficiency of a Microbial Process with an External Power Input: Thermodynamic Approach, 463
——: See de Kok, H. E.
——: See Esener, A. A.
——: See Geurts, Th. G. E.
——: See van Beynum, G. M. A.
Rogoff, M. H.: See Engler, R.
Ross, D. A.: See Couch, T. L.
Rudd, D. F.: See Fathi-Afshar, S.
Ruhm, K., and Kuhn, H. J.: Measurement of Small Volumetric Flow Rates in Small-Scale Chemostats, 655
Ruklisha, M.: See Shvinka, J.
Rundgren, S. T. M.: See Thomke, S.
Ryu, D. D. Y., and Hospodka, J.: Quantitative Physiology of *Penicillium chrysogenum* in Penicillin Fermentation, 289
——: See Rhee, D. K.
——: See Tassinari, T.

Sada, E., Katoh, S., and Terashima, M.: Performance of an Enzyme Reactor Utilizing a Magnetic Field, 243
Sae, A. S. W., and Bowen, J. D.: Simple Device for the Spectrophotometric Assay of Immobilized Enzymes, 227
Sakimoto, M.: See Ooshima, H.
Samuel, W. A., Lee, Y. Y., and Anthony, W. B.: Lactic Acid Fermentation of Crude Sorghum Extract, 757
Sandhu, D. K.: See Sidhu, M. S.
Sasaki, K., Nishizawa, Y., and Nagai, S.: Growth Yield from Electrons Available from Substrates in Aerobic- and Photoheterotrophic Cultures of *Rhodopseudomonas sphaeroides* S, 2529
Scardi, V.: See Greco, Jr., G.
Scarpini, G.: See Muzzarelli, R. A. A.
Schlegel, H. G.: See Ibrahim, M.
Seeley, H. W.: See Kargi, F.
Seichert, L.: See Ujcová, E.
Seijo, H.: See Matsumoto, K.
Seliger, H., Teufel, E. H., and Philipp, M.: Preparation of Immobilized Phosphodiesterase from Calf Spleen and its Use in Oligonucleotide Analysis, 55
Sernetz, M.: See Hannibal-Friedrich, O.
Shafizadeh, F.: See Kelsey, R. G.
Sheintuch, M.: Dynamics of Commensalistic Systems with Self- and Cross-Inhibition, 2557
Shibasaki, I.: See Tsuchido, T.
Shieh, T. R., and Bohmfalk, G. T.: Production and Efficacy of Baculoviruses, 1357
Shieh, W. K.: Suggested Kinetic Model for the Fluidized-Bed Biofilm Reactor, 667
Shirkot, C. K.: See Vohra, R. M.
Shuler, M. L.: See Kargi, F.
Shvinka, J., Viesturs, U., and Ruklisha, M.: Yield Regulation of Lysine Biosynthesis in *Brevibacterium flavum*, 897
Sidhu, M. S., and Sandhu, D. K.: Single-Cell Protein Production by *Trichoderma longibrachiatum* on Treated Sugar-Cane Bagasse, 689

Sieber, M.: See Konecny, J.
Sievänen, R.: See Holmberg, A.
Silman, R. W.: Enzyme Formation during Solid-Substrate Fermentation in Rotating Vessels, 411
——, Black, L. T., McGhee, J. E., and Bagley, E. B.: Hydrolysis of Raffinose in a Hollow-Fiber Reactor Using an Unrefined Mixture of α-Galactosidase and Invertase, 533
Singer, S.: *Bacillus sphaericus* for the Control of Mosquitoes, 1335
Sinkule, J.: See Linek, V.
Sinskey, A. J.: See Miyasaka, Y.
Sitton, O. C., and Gaddy, J. L.: Ethanol Production in an Immobilized-Cell Reactor, 1735
Smirnov, M. D.: See Martinek, K.
Smith, E. D.: See Wu, Y. C.
Spano, L.: See Tassinari, T.
Spencer-Martins, I.: See van Uden, N.
Stein, Y.: See Merchuk, J. C.
Steinhauer, L. P.: See Dawson, P. S. S.
Strom, P. F.: See Koopman, B.
Sturmanis, I. A.: See Viesturs, U. E.
Stutzenberger, F. J., and Bowden, M. W.: Potential Health Hazard in Cellulose Bioconversions by Thermophilic Actinomycetes, 2443
Subramanian, T. V.: Process Hydrolysis of Starch with Enzyme Catalysts, 661
Sund, W. E.: See Lovrien, R.
Sütcü, M.: See Girard, H. C.
Suzuki, H.: See Kobayashi, H.
Suzuki, S.: See Aizawa, M. M.
——: See Karube, I.
——: See Matsumoto, K.
——: See Matsunaga, T.
——: See Morikawa, Y.
Swaisgood, H. E.: See Taylor, J. B.

Taguchi, H.: See Yoshida, T.
Tanaka, H.: See Miura, Y.
Tandoi, V.: See Beccari, M.
Tanfani, F.: See Muzzarelli, R. A. A.
Tassinari, T., Macy, C., Spano, L., and Ryu, D. D. Y.: Energy Requirements and Process Design Considerations in Compression-Milling Pretreatment of Cellulosic Wastes for Enzymatic Hydrolysis, 1689
Taylor, J. B., and Swaisgood, H. E.: Microrecirculation Reactor System for Characterization of Immobilized Enzymes, 2617
Terashima, M.: See Sada, E.
Teufel, E. H.: See Seliger, H.
Thomke, S., Rundgren, S. T. M., and Eriksson, S.: Nutritional Evaluation of the White-Rot Fungus *Sporotrichum pulverulentum* as a Feedstuff to Rats, Pigs, and Sheep, 2285
Thomson, N., and Ollis, D. F.: Extracellular Microbial Polysaccharides. II. Evolution of Broth Power-Law Parameters for Xanthan and Pullulan Batch Fermentation, 875
Toda, K., Yabe, I., and Yamagata, T.: Kinetics of Biphasic Growth of Yeast in Continuous and Fed-Batch Cultures, 1805
Topiwala, H. H.: See Pickett, A. M.
Tosa, T.: See Yamamoto, K.
Tsao, G. T.: See Gong, C-S.
——: See Hsu, T-A.
——: See Ladisch, M. R.
Tsuchido, T., and Shibasaki, I.: Kinetics of Microbial Death by Combined Treatment with Heat and Antimicrobial Agents, 107
Tsuchiya, K., Kimura, T., Okazaki, M., and Miura, Y.: Growth Kinetics under Adenine-Limiting Conditions of *Bacillus subtilis* KYA 741, and Adenine-Requiring Strain, 401
Tyagi, R. D., and Ghose, T. K.: Batch and Multistage Continuous Ethanol Fermentation of Cellulose Hydrolysate and Optimum Design of Fermentor by Graphical Analysis, 1907

Uchida, T.: See Wada, M.
Ueda, S.: See Ohba, R.
Ujcová, E., Fenci, Z., Musíková, M., and Seichert, L.: Dependence of Release of Nucleotides from Fungi on Fermentor Turbine Speed, 237
Ujikawa, K., and Brazzach, M. L.: Calculation of Wort Composition According to Desired Productivity and Elementary Compositions, 1271

Vairo, M. L. R.: See Borzani, W.
Vallander, L.: See Eriksson, K-E.
van Beynum, G. M. A., Roels, J. A., and van Tiburg, R.: Equilibrium Relationships in the Degradation of Starch by an Amylo-

glucosidase, 643
van den Oever, A. H. C.: See Verkooyen, A. H. M.
van Suijdam, J. C.: See Roels, J. A.
van Tilburg, R.: See van Beynum, G. M. A.
Van't Riet, K.: See Heijnen, J. H.
van Uden, N., Cabeca-Silva, C., Madeira-Lopes, A., and Spencer-Martins, I.: Selective Isolation of Derepressed Mutants of an α-Amylase Yeast by the Use of 2-Deoxyglucose, 651
——: See Da Costa, M. B.
van Velsen, A. F. M.: See Lettinga, G.
Vashon, R.: See Kargi, F.
Vecchio, G.: See D'Angiuro, L.
Verkooyen, A. H. M., and Rietema, K.: Growth of Yeast on *n*-Alkanes. I. Stochastic Model, 571
——, and ——: Growth of Yeast on *n*-Alkanes. III. Batch Experiments, 615
——, van den Oever, A. H. C., and Rietema, K.: Growth of Yeast on *n*-Alkanes. II. Adsorption–Desorption Phenomena, 597
Verstraete, W., and Vissers, W.: Relationship between Phosphate Stress, Effluent Quality, and Observed Cell Yield in a Pure-Oxygen Activated-Slude Plant, 2591
Viesturs, U. E., Sturmanis, I. A., Krikis, V. V., Prokopenko, V. D., and Erickson, L. E.: Investigation of Fermentors with Various Contacting Devices, 799
——: See Shvinka, J.
Vissers, W.: See Verstraete, W.
Vohra, R. M., Shirkot, C. K., Dhawan, S., and Gupta, K. G.: Effect of Lignin and Some of its Components on the Production and Activity of Cellulase(s) by *Trichoderma reesei*, 1497

Wada, M., Uchida, T., Kato, J., and Chibata, I.: Continuous Production of L-Isoleucine Using Immobilized Growing *Serratia marcescens* Cells, 1175
——: See Aizawa, M. M.
Wake, L. V., and Hillen, L. W.: Study of a "Bloom" of the Oil-Rich Alga *Botryococcus braunii* in the Darwin River Reservoir, 1637
Wasserman, B. P., Hultin, H. O., and Jacobson, B. S.: High-Yield Method for Immobilization of Enzymes, 271
Webster, I. A.: Comments on the Influence of Diffusive Effects on the Lineweaver–Burk Plot, 2455
Weiland, R. H.: See Do, D. D.
Weiss, R. M., and Ollis, D. F.: Extracellular Microbial Polysaccharides. I. Substrate, Biomass, and Product Kinetic Equations for Batch Xanthan Gum Fermentation, 859
Weiss, S. A.: Concentration of Baboon Endogenous Virus in Large-Scale Production by Use of Hollow-Fiber Ultrafiltration Technology, 19
Weyrauch, K. W.: See Dougall, D. K.
Wilder, C. T., Cadman, T. W., and Hatch, R. T.: Feedback Control of a Competitive Mixed-Culture System, 89
Wilke, C. R.: See Castanon, M.
——: Maiorella, B.
Wolthuis, A. J.: See Heijnen, J. H.
Wong, B. L.: See Areson, P. D. W.
Wren, S. J.: See Drozd, J. W.
Wu, Y. C., Smith, E. D., and Hung, Y. T.: Modeling of Rotating Biological Contactor Systems, 2055

Yabe, I.: See Toda, K.
Yamagata, T.: See Toda, K.
Yamamoto, K., Tosa, T., and Chibata, I.: Continuous Production of L-Alanine Using *Pseudomonas dacunhae* Immobilized with Carrageenan, 2045
Yang, H. H., Effland, M. J., and Kirk, T. K.: Factors Influencing Fungal Degradation of Lignin in a Representative Lignocellulosic, Thermomechanical Pulp, 65
Yoshijima, S.: See Kitano, H.
Yoshida, T., Ohasa, S., and Taguchi, H.: On-Line Estimation of k_LA by an Analog Computer, 201
Young, M. E., Carroad, P. A., and Bell, R. L.: Estimation of Diffusion Coefficients of Proteins, 947
Yugari, Y.: See Minamoto, Y.

Ziegler, H., Dunn, I. J., and Bourne, J. R.: Oxygen Transfer and Mycelial Growth in a Tubular Loop Fermentor, 1613

Subject Index to Volume XXII

Acid hydrolysis of cellulose, pretreatment with, 1449
Acidophilic microorganisms, comparison with *Thiobacillus ferrooxidans*, 2543
Acinetobacter sp., growth medium, 495
Acrylic beads, for enzyme immobilization, 157
Actinomycetes, thermophilic, for cellulose hydrolysis, 2443
Actinoplanes missouriensis, glucose isomerase of, 833
Activated sludge, properties of, 969
  pure oxygen plant, 2591
Aeration, computer estimation of K_LA, 201
  dynamic measurement of K_LA in viscous systems, 1945
  in tubular loop fermenter, 1613
  sparger design for, 1985
  surface, in small vessels, 981
Agitation, fermenter, 237
L-Alanine, production by *Pseudomonas dacunhae*, 2045
Albumin, immobilized, 157
Algae, oil-rich, 1637
Alkanes, yeast growth on, 571, 597, 615
Amylase, content of *Bacillus subtilis* cultures, 1657
  fungal, immobilized, 1753
β-Amylase, immobilized, 1753, 2137
Amyloglucosidase, starch degradation by, 643
Animal cells, cultivation of, 477
Anthocyanin, production by carrot cultures, 337
Antibiotic production, 289, 1015, 1785
Aspergillus niger, wastes, chitosan–glucan complex from, 885
  β-xylosidase of, 1127, 1143
Aureobasidium pullulans, polysaccharide production by, 2321
Azotobacter vinelandii, adsorption isotherms for, 1283
  polysaccharide production by, 2321

Baboon endogenous virus, large-scale production, 19
Bacillus sphaericus, for mosquito control, 1335
Bacillus subtilis, cultures, enzyme activities of, 1657
  growth kinetics of, 401
Bacillus thuringiensis, for exotoxin production, 1707
  production and utilization of, 1297
Bacillus thuringiensis protein, structure and function, 1305
Bacitracin, continuous production by immobilized cells, 1015
Baculoviruses, infectivity and mode of action, 1377
  production and efficacy of, 1357
Bagasse, microbial protein production from, 689
Balances, elementary and energy, for continuous culture, 1097
Batch processes, 421, 457, 1543, 1657, 1785, 1805, 1907, 1979, 2097, 2321
Biofilm kinetics, steady-state, 2343, 2359
Biological waste treatment processes, activated sludge, 969, 2591
  anaerobic, 699, 847
  fast flow reactor for, 2579
  upflow sludge blanket reactor, 699
Biomass, elemental composition and energy content, 451
  production from volatile hydrocarbons, 995
Blood, immunosorption of antigen from, 2207
BOD, yeast, sensor for, 221
Botryococcus braunii, bloom of, 1637
Bovine liver catalase, for hydrogen peroxide cleavage, 1895
Brazil, ethanol program, 1989
Brevibacterium flavum, lysine synthesis by, 897

Calorimetry, bomb, preparation of microbial cells for, 2417
Candida lipolytica, cultivation on hexadecane, 421

Candida tropicalis, cell surface of, 1829
Candida utilis, cell cycle of, 137
Carbon dioxide, in batch culture calculations, 1979
  steam-sterilizable electrode for, 2411
Carrageenan, for immobilization of cells, 2045
Carrot cultures, growth and anthocyanin production by, 337
Casein, hydrolysis by immobilized trypsin, 543
Catalase, and oxidation of glucose, 2515
Catalase-containing yeast, immobilized, 2191
Catechol, enzyme probe for, 913
Cellodextrin, hydrolysis by *Trichoderma reesei*, 2305
Cells, composition during batch bacterial growth, 457
  immobilized, 119, 681, 847, 1015, 1155, 1175, 1283, 1489, 1735, 2045, 2191, 2607
  methane production by, 847
  microbial, heat of combustion of, 1095
Cellulases, adsorption and recovery of, 1037
  of *Thermomonospora* sp., 1515, 1527
  production by *Trichoderma reesei*, 1497, 2305
  production by *Trichoderma* sp., 2237
  stability of, 323, 1515
Cellulose, *p*-amino carbanilated, for enzyme immobilization, 311
  milling pretreatment of, 1689
  partial acid hydrolysis of, 1449
  structural features of, effects on hydrolysis, 177
Cellulose hydrolysis, 1515, 1527, 1601
  enhancement by wet milling, 1025
  enzymatic, mechanism of, 177
  of newspaper, 1037
  potential health hazards in, 2443
  pretreatment with acid hydrolysis, 1449
Cephalexin, enzymatic biosynthesis of, 1237
Cephalosporin, continuous deacetylation of, 2013
Chemostat, measurement of flow rates, in, 655
Chitosan–glucan complex, characteristics of, 885
Chloroplasts, immobilized, 2655
Choline, amperometric determination of, 1071
Choline oxidase, immobilized, 1071
Chromatography, hydrophobic, of β-galactosidase, 377
Combustion, heat of, microbial cells, 1095
Commensalistic systems, dynamics of, 2557
Computer, analog, for estimation of $K_L A$, 201
Continuous culture, yeast, 231, 1097
Continuous processes, 231, 1015, 1097, 1175, 1567, 1785, 1805, 1857, 1907, 2013, 2045, 2097
Control, feedback, in mixed culture system, 89
Corynebacterium simplex, immobilized, for steroid transformation, 119
Crotalaria juncea, preparation of lectin from, 79

Dextransucrase, of *Leuconostoc mesenteroides*, immobilized, 1055
Dextrin, hydrolysis by immobilized glucoamylase, 1
Diffusion coefficients, of proteins, 947
Diffusion effects, and Lineweaver–Burk plot, 2455
Dissolved oxygen probes, interfacing of, 473

Electrode, pCO_2, steam-sterilizable, 2411
Electrodes, enzyme, for catechol, 913
  for phenol, 299
Endoglucanase, from *Trichoderma reesei*, 1107
Energetic efficiency, of microbial processes, 463
Energetics, growth, in microbial protein production, 353
  model of, 33
Energy requirements, milling of cellulosic wastes, 1689
  Vacuferm process, 1749
Enzymatic assay, kinetic, for ethanol, 2383, 2437
Enzyme formation, in solid substrate fermentation, 411
Enzyme reactors (see Reactors, Enzyme)
Enzymes, deactivation kinetics, 1087
  denatured, reactivation of, 247
  immobilized, 1, 55, 157, 215, 227, 271, 311, 543, 735, 779, 919, 957, 1055, 1071, 1127, 1143, 1225, 1753, 1759, 2013, 2137, 2155, 2169, 2179, 2251, 2419, 2441, 2449, 2617

assay of, 227
kinetics of, 735, 1759, 2169
mass transfer effects, 543
Enzymes, immobilized, multilayer, 215
penetration into porous supports, 957
preparation of, 55, 157, 215, 271, 311, 919, 957, 1055, 1127, 1225, 2251, 2419, 2441
in photography, 1725
Ergot alkaloid, production by *Claviceps purpurea*, 255
Escherichia coli, growth and composition of, 1213
Ethanol, from biomass, as chemical feedstock, 677
fuel, by solid phase fermentation, 2425
kinetic assay of, 2383, 2437
Ethanol fermentation, in aqueous two-phase system, 2393
inhibition of, 2375
of cellulose hydrolysate, 1907
Ethanol production, Brazilian program, 1989
from whey ultrafiltrate, 1277
using immobilized cell reactor, 1489, 1735

Fermenters (see Reactors, Biological Process)
Fluidized bed biofilm reactor, kinetic model for, 667
Fluidized beds, biologically active, 1007
Fructose, from sucrose using yeast enzymes, 2179
production by *Lactobacillus* sp., 1957

α-Galactosidase, hydrolysis of raffinose by, 533
temperature and pH dependence of, 505
β-Galactosidase, hydrophobic chromatography of, 377
immobilized, 157, 311
Gas analysis, mobile unit for, 1273
Gas environments, controlled, effects on rice fermentation, 2219
Gas production, by immobilized cells, 681
γ-Globin, immobilized, 157
Glucoamylase, immobilized, 1, 1753
Gluconic acid, from sucrose using yeast enzymes, 2179
Glucose, sensor for, 1287
D-Glucose, kinetics of oxidation of, 2515
Glucose isomerase, immobilized, 1287
of *Actinoplanes missouriensis*, 833
production of, 519
Glucose oxidase, immobilized, 1287
in microbial protein production, 353
kinetics of glucose oxidation by, 2515
β-Glucosidase, production by *Trichoderma reesei*, 2429
β-Glucuronidase, immobilized, 2441
Growth, microbial, on nitrate, 1929
mycelial, in tubular loop fermenter, 1613
of *Claviceps purpurea*, model for, 255
of *Trichoderma* QM9414, 821
yields, of *Rhodopseudomonas sphaeroides* S, 2529
Growth energetics, model for, 33

Haldane equation, for biodegradation kinetics, 2405
Heat production, in bubble columns, 2399
Hemicellulose, extraction from rye grass, 519
Hepatitis B surface antigen, immunosorption of, 2207
Hexadecane, partition of, 495, 1829
Hydrocarbons, microbial protein production from, 421, 571, 597, 615, 995
Hydrogen peroxide, cleavage by catalase, 1895
oxygen transfer by, 1877
Hydrogen-producing bacteria, immobilized, 2607
Hydroxylamine, inhibitor in ethanol assay, 2437

Immobilized enzymes (see Enzymes, Immobilized)
Immunosorption, of hepatitis B surface antigen, 2207
Inhibition, in biodegradation kinetics, 2405
in commensalistic systems, 2557
Insects, microbial agents for control of, 1295, 1297, 1305, 1335, 1441
nematodes for control of, 1407
Invertase, immobilized, 2155, 2169
L-Isoleucine, continuous production of, 1175

Kinetics, biodegradation, substrate inhibition in, 2405
aerobic conversjon of poultry waste, 1567
batch polysaccharide fermentations, 2321

biological waste treatment processes, 2081
biphasic yeast growth, 1805
cellobiose hydrolysis, 1107
cellodextrin hydrolysis, 2305
enzymatic protein modification, 1543
enzyme reactions and deactivation, 1087
glucose oxidation, 2515
growth, of *Bacillus subtilis*, 401
hollow-fiber enzyme reactor, 2643
immobilized enzymes, 1, 1759
immobilized invertase, 2169
immobilized penicillin acylase, 735
membrane enzyme reactor, 2633
microbial death, 107
microbial polysaccharide formation, 859, 875
mixed cultures, 929
Monod equation, for product inhibition, 1671
steady-state biofilm, 2343, 2359

Lactic acid fermentation, of sorghum, 757
Lactobacillus sp., heat fixed, for fructose production, 1957
Lectin, preparation from sunn hemp seeds, 79
Leuconostoc mesenteroides, dextran sucrase of, 1055
Level control, in chemostat, 2433
Lignin, effects on cellulase production and activity, 1497
fungal degradation of, 65
Lignocellulosic wastes, purification of, 2273
Lineweaver–Burk plot, diffusive effects and, 2455
Lysine biosynthesis, 897

Maltose, production from starch, 2137
Maltose syrups, production by immobilized enzymes, 1753
Maltotriose, production from starch, 2137
Mathematical models (see Models)
Metabolism, microbial, application of macroscopic principles, 2547
Methane production, by immobilized bacteria, 847
Methane-utilizing mixed culture, 2097, 2119
Methanol, microbial protein production from, 353
Methanol oxidase, of yeast, 1155
Microbial death, kinetics of, 107
Microbial processes, energetic efficiency of, 463
for exotoxin production, 1707
Microcalorimetry, of metabolism, 1249
Microfluorometry, enzyme content of *B. subtilis* cultures by, 1657
for measurement of cell composition, 457
Mitochondrial electron transport particle, immobilized, 1769
Mixed cultures, feedback control in, 89
methane utilizing, 2097, 2119
stability analysis of, 929
Models, fluidized bed biofilm reactor, 667
distributed parameter, for airlift fermenter, 1189
growth and alkaloid production by *Claviceps purpurea*, 255
growth energetics, 33
growth of *Streptococcus cremoris* HP, 1465
kinetic, biological waste treatment process, 2081
rotating disc contactor systems, 2055
steady-state biofilm kinetics, 2343
yeast growth on alkanes, 571
Molecular sieve (type 4A), for enzyme immobilization, 543
Monod equation, for product inhibition, 1671
Mutants, of *Trichoderma reesei*, β-glucosidase production by, 2429
of white-rot fungi, 363
temperature sensitive, for microbial protein production, 2065
yeast, selective isolation of, 651

NADH, determination of, 1769
NADPH, photochemical regeneration, 2655
Nitrate, as nitrogen source for microbial growth, 1929
Nucleotides, release of from fungi, 237

Oligonucleotide analysis, use of phosphodiesterase in, 55
Optical density, continuous monitoring of, 639
Oxygen, dissolved, probes for, 473
Oxygen transfer, by hydrogen peroxide, 1877

in tubular loop fermenter, 1613
Oxygen transfer rate, measurement of, 1509, 1945

Penicillin acylase, immobilized, 735
Penicillin production, by *Penicillium chrysogenum*, 289
Penicillium chrysogenum, quantitative physiology of, 289
Phased culture, of *Candida utilis*, 137
Phenol, enzyme electrode for, 299
Phosphate stress, in activated sludge process, 2591
Phosphodiesterase, immobilized, from calf spleen, 55
Phosphotransferase, immobilized, 2419
Photographic process, using enzymes, 1725
Plant cells, cultivation of, 337
Polymethylglutamate, for enzyme immobilization, 1225
Polysaccharides, microbial, production of, 859, 875, 2321
Poultry waste, aerobic conversion to microbial protein, 1567
Power dissipation, in bubble columns, 2399
Progesterone, 11α-hydroxylase, production by *Rhizopus nigricans*, 555
Protease, content of *Bacillus subtilis* cultures, 1657
Protein, microbial, *Candida lipolytica*, 421
  elemental composition and energy content, 451
  from bagasse, 689
  from lignocellulosic wastes, 2273, 2285
  from poultry waste, 1567
  growth energetics in production of, 353
  production by *Trichoderma longibrachiatum*, 689
  temperature-sensitive mutants for, 2065
  vegetable, enzymatic modification of, 1543
Proteins, diffusion coefficients of, 947
Protozoa, production and efficacy of, 1415
Pseudomonas dacunhae, immobilized, L-alanine production by, 2045
Pseudomonas sp., polysaccharide production by, 2321
Pullulan, batch fermentation for, 875
  enzymatic hydrolysis of, 2137
Pullulanase, immobilized, 2137

Radiorespirometry, for observations of cell growth, 137
Raffinose, hydrolysis of, 533
Reactors, biological process, aeration in, 981, 1509
  airlift fermenter, 1189
  fast flow for waste treatment, 2579
  fluidized bed, 667, 1007
  gas analysis unit for, 1273
  level control for, 2433
  microcirculation, 2617
  optimum design by graphical analysis, 1907
Reactors, biological process, rotating disc contactor, 2055
  rotating vessel, 411
  sparger design for, 1985
  tubular loop fermenter, 1613
  upflow sludge blanket, 699
  with various contacting devices, 799
  enzyme, hollow fiber, 533, 2643
    membrane, 2633
    with magnetic field, 243
  immobilized enzyme, 2617
    elution of, 779
  immobilized yeast cell, 1489, 1735
Rhizopus nigricans, progesterone 11α-hydroxylase production by, 555
Rhodopseudomonas sphaeroides S, growth yields of, 2529
Rice, fermentation of, 2219

Saccharomyces cerevisiae, continuous culture of, 231, 1097
  growth on mixed substrates, 2031
  temperature-sensitive mutants of, 2065
Sand, for enzyme immobilization, 919, 2449
Serratia marcescens, immobilized, for isoleucine production, 1175
Solid substrates, enzyme production on, 411
  ethanol fermentation of, 2425
Sorghum, lactic acid fermentation of, 757
Spectrophotometry, for immobilized enzyme assay, 227
Sporotrichum pulverulentum, as animal feed, 2285
  for protein production, 2273
Starch, degradation by amyloglucosidase, 643
  hydrolysis, enzymatic, 661, 1501, 2137
Sterilization, kinetics of, 107

Steroid transformation, by immobilized cells, 119
Straw, hemicellulose extraction from, 519
Straw residue, as animal feed, 519
Streptococcus cremoris HP, growth, model of, 1465
Sucrose, conversion to fructose and gluconic acid, 2179
  production from starch, enzymatic, 1501

Temperature, effects on continuous yeast culture, 231
Thermomonospora sp., cellulose hydrolysis by, 1515, 1527
Thiobacillus ferrooxidans, cell envelope of, 2543
Trichoderma longibrachiatum, microbial protein production by, 689
Trichoderma reesei, cellulase production by, 1497
  endoglucanase from, 1107
  exocellulases of, 2305
  β-glucosidase production by, 2429
  oxygen uptake of, 693
Trichoderma reesei cellulase, stability of, 337
Trichoderma QM9414, growth rate of, 821
Trichoderma viride, cellulose hydrolysis by, 1601
Trichoderma sp., cellulase production by, 2237
Trypsin, immobilized, 543, 919, 2449
Tylosin, production of, 1785

Ultrafiltration, hollow-fiber, in virus production, 19
Urease, immobilized, 1225
Uricase, immobilized, 1225

Vacuferm process, energy requirements for, 1749
Virus production, hollow-fiber ultrafiltration in, 19

Waste treatment, biological (see Biological Waste Treatment)
Wastes, lignocellulosic, purification of, 2273
Whey, ultrafiltrate, alcohol production in, 1277
White-rot fungi, for protein production, 2273, 2285
  for purification of lignocellulosic wastes, 2273
  growth in wood, 363
Wort composition, calculation of, 1271

Xanthan, batch fermentation for, 859, 875
β-Xylosidase, of *Aspergillus niger*, 1127, 1143

Yeast, growth on alkanes, 421, 571, 597, 615
  growth on mixed substrates, 2031
  immobilized, catalase-containing, 2191
    for ethanol fermentation, 1489
  kinetics for biphasic growth, 1805
  mutants, selective isolation of, 651
  with methanol oxidase activity, immobilized, 1155
Yeast BOD sensor, 221
Yeast multienzyme complex, immobilized, 2179

Biotechnology and Bioengineering

Contents of Volume XXII, 1980

Issue No. 1, January

Effect of Pore Diffusion Limitation on Dextrin Hydrolysis by Immobilized Glucoamylase
D. D. Lee, G. K. Lee, P. J. Reilly, and Y. Y. Lee 1

Concentration of Baboon Endogenous Virus in Large-Scale Production by Use of Hollow-Fiber Ultrafiltration Technology
S. A. Weiss 19

Simple Model for the Energetics of Growth on Substrates with Different Degrees of Reduction
J. A. Roels 33

Preparation of Immobilized Phosphodiesterase from Calf Spleen and its Use in Oligonucleotide Analysis
H. Seliger, E. H. Teufel, and M. Philipp 55

Factors Influencing Fungal Degradation of Lignin in a Representative Lignocellulosic, Thermomechanical Pulp
H. H. Yang, M. J. Effland, and T. K. Kirk 65

Large-Scale Preparation of a Lectin from Sunn Hemp Seeds (*Crotalaria juncea*)
B. Ersson 79

Feedback Control of a Competitive Mixed-Culture System
C. T. Wilder, T. W. Cadman, and R. T. Hatch 89

Kinetics of Microbial Death by Combined Treatment with Heat and Antimicrobial Agents
T. Tsuchido and I. Shibasaki 107

Steroid Transformation at High Substrate Concentrations Using Immobilized *Corynebacterium simplex* Cells
A. Constantinides 119

Dynamic Aspects of Radiorespirometry during the Cell Cycle of *Candida utilis:* Some Observations in Phased Culture under Carbon-, Nitrogen-, and Phosphorus-Limited Growth
P. S. S. Dawson and L. P. Steinhauer 137

Immobilization of β-Galactosidase, Albumin, and γ-Globulin on Epoxy-Activated Acrylic Beads
O. Hannibal-Friedrich, M. Chun, and M. Sernetz 157

Mechanism of the Enzymatic Hydrolysis of Cellulose: Effects of Major Structural Features of Cellulose on Enzymatic Hydrolysis
L. T. Fan, Y.-H. Lee, and D. H. Beardmore 177

On-Line Estimation of k_La by an Analog Computer
T. Yoshida, S. Ohasa, and H. Taguchi 201

Communications to the Editor

Experimental Technique for Multilayer Enzyme Immobilization
G. Greco, Jr., D. Albanesi, M. Cantarella, and V. Scardi 215

Yeast BOD Sensor
J. Kulys and K. Kadziauskienė 221

Simple Device for the Spectrophotometric Assay of Immobilized Enzymes
A. S. W. Sae and J. D. Bowen 227

Response of a Continuous Culture of *Saccharomyces cerevisiae* to Variation of Temperature
W. Borzani, M. L. R. Vairo, L. Perego, Jr., L. H. Koshimizu, M. Regina de Melo Cruz, and J. M. Cabral de Souza Dias 231

Dependence of Release of Nucleotides from Fungi on Fermentor Turbine Speed
E. Ujcová, Z. Fencl, M. Musílková, and L. Seichert 237

Performance of an Enzyme Reactor Utilizing a Magnetic Field
E. Sada, S. Katoh, and M. Terashima 243

Reactivation of "Irreversibly" Denatured Enzymes
K. Martinek, V. V. Mozhaev, M. D. Smirnov, and I. V. Berezin 247

Information for Contributors 253

Issue No. 2, February

Model of Growth and Ergot Alkaloid Production by *Claviceps purpurea*
B. Grm, M. Mele, and M. Kremser 255

High-Yield Method for Immobilization of Enzymes
B. P. Wasserman, H. O. Hultin, and B. S. Jacobson 271

Quantitative Physiology of *Penicillium chrysogenum* in Penicillin Fermentation
D. D. Y. Ryu and J. Hospodka 289

Enzyme Electrode for Phenol
K. G. Kjellén and H. Y. Neujahr 299

Immobilization of β-Galactosidase and Other Enzymes onto *p*-Amino-Carbanilated Cellulose Derivatives
C. G. Beddows, R. A. Mirauer, and J. T. Guthrie 311

Stability of the Cellulase of *Trichoderma reesei* under Use Conditions
E. T. Reese and M. Mandels 323

Growth and Anthocyanin Production by Carrot Suspension Cultures Grown under Chemostat Conditions with Phosphate as the Limiting Nutrient
D. K. Dougall and K. W. Weyrauch 337

Growth Energetics in the Production of Bacterial Single Cell Protein from Methanol
J. W. Drozd and S. J. Wren 353

Studies of Growth Conditions in Wood for Three White-Rot Fungi and Their Cellulaseless Mutants
K.-E. Eriksson, A. Grünewald, and L. Vallander 363

Hydrophobic Chromatography of β-Galactosidase
C.-T. Chang, B. J. McCoy, and R. G. Carbonell 377

Growth Kinetics under Adenine-Limiting Conditions of *Bacillus subtilis* KYA 741, an Adenine-Requiring Strain
K. Tsuchiya, T. Kimura, M. Okazaki, and Y. Miura 401

Enzyme Formation during Solid-Substrate Fermentation in Rotating Vessels
R. W. Silman 411

Data Consistency, Yield, Maintenance, and Hysteresis in Batch Cultures of *Candida lipolytica* Cultured on *n*-Hexadecane
A. Ferrer and L. E. Erickson 421

Communications to the Editor

Biomass Elemental Composition and Energy Content
L. E. Erickson 451

Flow Microfluorometry Measurements of Multicomponent Cell Composition during Batch Bacterial Growth
J. Fazel-Madjlessi, J. E. Bailey, and D. N. McQuitty 457

Energetic Efficiency of a Microbial Process with an External Power Input: Thermodynamic Approach
J. A. Roels and J. C. van Suijdam 463

On Interfacing Different Types of Dissolved Oxygen Probes
Y. H. Lee 473

Information for Contributors 475

Issue No. 3, March

Monolayer Cultures of Animal Cells with the Gyrogen Equipped with Tubes
H. C. Girard, M. Sütcü, H. Erdem, and I. Gürhan 477

Characteristics of Hexadecane Partition by the Growth Medium of *Acinetobacter* sp.
O. Käppeli and W. R. Finnerty 495

Temperature and pH Dependence of Mold α-Galactosidase
H. Kobayashi and H. Suzuki 505

Extraction of Hemicellulose from Ryegrass Straw for the Production of Glucose Isomerase and Use of the Resulting Straw Residue for Animal Feed
W. P. Chen and A. W. Anderson 519

Hydrolysis of Raffinose in a Hollow-Fiber Reactor Using an Unrefined Mixture of α-Galactosidase and Invertase
R. W. Silman, L. T. Black, J. E. McGhee, and E. B. Bagley 533

Effect of External Mass Transfer on Activation Energy of Hydrolysis of BAEE and Casein by Trypsin Immobilized on Molecular Sieve Type 4A
R. N. Mukherjea, P. Bhattacharya, T. Gangopadhyay, and B. K. Ghosh 543

Optimization of the Production of Progesterone 11α-Hydroxylase by *Rhizopus nigricans*
W. H. Hanisch, P. Dunnill, and M. D. Lilly 555

Growth of Yeast on *n*-Alkanes. I. Stochastic Model
A. H. M. Verkooyen and K. Rietema 571

Growth of Yeast on *n*-Alkanes. II. Adsorption–Desorption Phenomena
A. H. M. Verkooyen, A. H. C. van den Oever, and K. Rietema 597

Growth of Yeast on *n*-Alkanes. III. Batch Experiments
A. H. M. Verkooyen and K. Rietema 615

Communications to the Editor

New Device for Continuously Monitoring the Optical Density of Concentrated Microbial Cultures
C. Lee and H. Lim 639

Equilibrium Relationships in the Degradation of Starch by an Amyloglucosidase
G. M. A. van Beynum, J. A. Roels, and R. van Tilburg 643

Selective Isolation of Derepressed Mutants of an α-Amylase Yeast by the Use of 2-Deoxyglucose
N. van Uden, C. Cabeça-Silva, A. Madeira-Lopes, and I. Spencer-Martins 651

Measurement of Small Volumetric Flow Rates in Small-Scale Chemostats
K. Ruhm and H. J. Kuhn 655

Process Hydrolysis of Starch with Enzyme Catalysts
T. V. Subramanian 661

Suggested Kinetic Model for the Fluidized-Bed Biofilm Reactor
W. K. Shieh 667

Biomass Ethanol as a Chemical Feedstock in the United States
S. Fathi-Afshar and D. F. Rudd 677

Gas Production by Immobilized Microorganisms: Theoretical Approach
P. G. Krouwel and N. W. F. Kossen 681

Single-Cell Protein Production by *Trichoderma longibrachiatum* on Treated Sugar-Cane Bagasse
M. S. Sidhu and D. K. Sandhu 689

Oxygen Uptake of *Trichoderma reesei*
L. E. Erickson 693

Information for Contributors 697

Issue No. 4, April

Use of the Upflow Sludge Blanket (USB) Reactor Concept for Biological Wastewater Treatment, Especially for Anaerobic Treatment
G. Lettinga, A. F. M. van Velsen, S. W. Hobma, W. de Zeeuw, and A. Klapwijk 699

Kinetic Behavior of Immobilized Penicillin Acylase
S. W. Carleysmith, P. Dunnill, and M. D. Lilly 735

Lactic Acid Fermentation of Crude Sorghum Extract
W. A. Samuel, Y. Y. Lee, and W. B. Anthony 757

Pulse Response in an Immobilized-Enzyme Column: Theoretical Method for Predicting Elution Curves
S. Adachi, K. Hashimoto, R. Matsuno, K. Nakanishi, and T. Kamikubo 779

Investigation of Fermentors with Various Contacting Devices
U. E. Viesturs, I. A. Sturmanis, V. V. Krikis, V. D. Prokopenko, and L. E. Erickson 799

Estimation of *Trichoderma* QM 9414 Biomass and Growth Rate by Indirect Means
T. Harima and A. E. Humphrey 821

Purification and Properties of Glucose Isomerase of *Actinoplanes missouriensis*
C.-S. Gong, L. F. Chen, and G. T. Tsao 833

Methane Production from Wastewaters by Immobilized Methanogenic Bacteria
I. Karube, S. Kuriyama, T. Matsunaga, and S. Suzuki 847

Extracellular Microbial Polysaccharides. I. Substrate, Biomass, and Product Kinetic Equations for Batch Xanthan Gum Fermentation
R. M. Weiss and D. F. Ollis 859

Extracellular Microbial Polysaccharides. II. Evolution of Broth Power-Law Parameters for Xanthan and Pullulan Batch Fermentation
N. Thomson and D. F. Ollis 875

Chelating, Film-Forming, and Coagulating Ability of the Chitosan–Glucan Complex from *Aspergillus niger* Industrial Wastes
R. A. A. Muzzarelli, F. Tanfani, and G. Scarpini 885

Yield Regulation of Lysine Biosynthesis in *Brevibacterium flavum*
J. Shvinka, U. Viesturs, and M. Ruklisha 897

Communication to the Editor

Enzyme Probe for Catechol
H. Y. Neujahr 913

Issue No. 5, May

Studies on the Immobilization of Trypsin on Sand
R. Puvanakrishnan and S. M. Bose 919

Stability Analysis of Commensal and Mutual Relations with Competitive Assimilation in Continuous Mixed Culture
Y. Miura, H. Tanaka, and M. Okazaki 929

Estimation of Diffusion Coefficients of Proteins
M. E. Young, P. A. Carroad, and R. L. Bell 947

Staining Method for Determination of the Penetration of Immobilized Enzyme into a Porous Support
S. W. Carleysmith, M. B. L. Eames, and M. D. Lilly 957

Relationship between Bulking and Physicochemical–Biological Properties of Activated Sludges
M. Beccari, P. Mappelli, and V. Tandoi 969

Surface Aeration in a Small, Agitated, and Sparged Vessel
C. M. Chapman, A. W. Nienow, and J. C. Middleton 981

Problems Concerning the Operation of High Productivity Biomass Fermentations Using Volatile Liquid Hydrocarbon Feedstocks
G. Hamer, I. Y. Hamdan, A. S. Khamis, and Z. H. Baroon 995

Biologically Active Fluidized Beds: Mechanistic Considerations
K. F. Ngian and W. R. B. Martin 1007

Continuous Production of Bacitracin by Immobilized Living Whole Cells of *Bacillus* sp.
Y. Morikawa, I. Karube, and S. Suzuki 1015

Enhancement of Cellulose Accessibility and Enzymatic Hydrolysis by Simultaneous Wet Milling
R. G. Kelsey and F. Shafizadeh 1025

Adsorption and Recovery of Cellulases during Hydrolysis of Newspaper
M. Castanon and C. R. Wilke 1037

Immobilization and Properties of *Leuconostoc mesenteroides* Dextransucrase
H. Kaboli and P. J. Reilly 1055

Amperometric Determination of Choline with Use of Immobilized Choline Oxidase
K. Matsumoto, H. Seijo, I. Karube, and S. Suzuki 1071

Communications to the Editor

Consistency between Rate Expressions for Enzyme Reactions and Deactivation
D. D. Do and R. H. Weiland 1087

Is the Heat of Combustion of Microbial Cells Predictable Solely from Organic Chemical Bonding?
W. J. Payne 1095

Method for the Statistical Treatment of Elemental and Energy Balances with Application to Steady-State Continuous-Culture Growth of *Saccharomyces cerevisiae* CBS 426 in the Respiratory Region
H. E. de Kok and J. A. Roels 1097

Information for Contributors 1105

Issue No. 6, June

Cellobiose Hydrolysis by Endoglucanase (Glucan Glucanohydrolase) from *Trichoderma reesei*: Kinetics and Mechanism
M. R. Ladisch, C.-S. Gong, and G. T. Tsao 1107

Purification and Immobilization of *Aspergillus niger* β-Xylosidase
G. B. Oguntimein and P. J. Reilly 1127

Properties of Soluble and Immobilized *Aspergillus niger* β-Xylosidase
G. B. Oguntimein and P. J. Reilly 1143

Immobilized Yeast Cells with Methanol Oxidase Activity: Preparation and Enzymatic Properties
R. Couderc and J. Baratti 1155

Continuous Production of L-Isoleucine Using Immobilized Growing *Serratia marcescens* Cells
M. Wada, T. Uchida, J. Kato, and I. Chibata 1175

Distributed Parameter Model of an Airlift Fermentor
J. C. Merchuk, Y. Stein, and R. I. Mateles 1189

Growth and Composition of *Escherichia coli* Subjected to Square-Wave Perturbations in Nutrient Supply: Effect of Varying Amplitudes
A. M. Pickett, M. J. Bazin, and H. H. Topiwala 1213

Polymethylglutamate as a New Matrix for Covalently Immobilized Enzymes: Preparation and Properties of Urease and Uricase
Y. Minamoto and Y. Yugari 1225

Enzymatic Biosynthesis of Cephalexin
D. K. Rhee, S. B. Lee, J. S. Rhee, D. D. Y. Ryu, and J. Hospodka 1237

Microcalorimetry of Microorganism Metabolism of Monosaccharides and Simple Aromatic Compounds
R. Lovrien, G. Jorgenson, M. K. Ma, and W. E. Sund 1249

Communications to the Editor

Calculation of Wort Composition According to Desired Productivity and Elementary Compositions
K. Ujikawa and M. L. Brazzach 1271

Mobile Self-Contained Off-Gas Analysis Units for Fermentation Pilot Plants
M. C. Flickinger, N. B. Jansen, and E. H. Forrest 1273

Alcohol Production by Yeast in Whey Ultrafiltrate
G. Moulin, M. Guillaume, and P. Galzy 1277

Adsorption Isotherms of *Azotobacter vinelandii* on Cellex E®
K. DeNicola and D. J. Kirwan 1283

Improvement of Glucose Sensor Performance with Immobilized Glucose Oxidase–Glucose Isomerase System
S. Gondo, M. Morishita, and T. Osaki 1287

Information for Contributors 1293

Issue No. 7, July

Symposium on Microbial Agents for the Control of Insect Pests

Introduction
H. T. Huang 1295

Production and Utilization of *Bacillus thuringiensis*
T. L. Couch and D. A. Ross 1297

Structure and Function of the *Bacillus thuringiensis* Protein Crystal
K. W. Nickerson 1305

Bacillus sphaericus for the Control of Mosquitoes
S. Singer 1335

Production and Efficacy of Baculoviruses
T. R. Shieh and G. T. Bohmfalk 1357

Infectivity and Mode of Action of Baculoviruses
R. R. Granados 1377

Possible Commercial Formulations of Insect-Parasitic Nematodes
W. R. Nickle 1407

Production and Efficacy of Protozoa
W. M. Brooks 1415

Registration and Regulation of Microbial Pesticides
R. Engler and M. H. Rogoff 1441

(*End of Symposium.*)

Partial Acid Hydrolysis of Cellulosic Materials as a Pretreatment for Enzymatic Hydrolysis
D. Knappert, H. Grethlein, and A. Converse 1449

Mechanistic Model of the Growth of *Streptococcus cremoris* HP at Superoptimal Temperatures
P. A. Franks, R. J. Hall, and P. M. Linklater 1465

Communications to the Editor

Rapid Ethanol Fermentation in Immobilized Yeast Cell Reactor
T. K. Ghose and K. K. Bandyopadhyay 1489

Effect of Lignin and Some of its Components on the Production and Activity of Cellulase(s) by *Trichoderma reesei*
R. M. Vohra, C. K. Shirkot, S. Dhawan, and K. G. Gupta 1497

Enzymatic Approaches to Production of Sucrose from Starch
S. J. Kelley and L. G. Butler 1501

Biological Method for the Measurement of the Maximum Oxygen Transfer Rate of a Bioreactor at Definite Conditions
O. Käppeli and A. Fiechter 1509

Information for Contributors 1513

Issue No. 8, August

Saccharification of Cellulose by the Cellulolytic Enzyme System of *Thermomonospora* sp. I. Stability of Cellulolytic Activities with respect to Time, Temperature, and pH
B. Hägerdal, J. D. Ferchak, and E. K. Pye 1515

Saccharification of Cellulose by the Cellulolytic Enzyme System of *Thermomonospora* sp. II. Hydrolysis of Cellulosic Substrates
J. D. Ferchak, B. Hägerdal, and E. K. Pye 1527

Enzymatic Modification of Vegetable Protein: Mechanism, Kinetics, and Production of Soluble and Partially Soluble Protein in a Batch Reactor
A. Constantinides and B. Adu-Amankwa 1543

Continuous Aerobic Conversion of Poultry Waste into Single-Cell Protein Using a Single Reactor: Kinetic Analysis and Determination of Optimal Conditions
F. Kargi, M. L. Shuler, R. Vashon, H. W. Seeley, A. Henry, and R. E. Austic 1567

Conversion of Cellulose to Glucose with Cellulase of *Trichoderma viride* ITCC-1433
D. Herr 1601

Oxygen Transfer and Mycelial Growth in a Tubular Loop Fermentor
H. Ziegler, I. J. Dunn, and J. R. Bourne 1613

Study of a "Bloom" of the Oil-Rich Alga *Botryococcus braunii* in the Darwin River Reservoir
L. V. Wake and L. W. Hillen 1637

Analysis of Fermentation Processes Using Flow Microfluorometry: Amylase and Protease Activities in *Bacillis subtilis* Batch Cultures
J. Fazel-Madjlessi and J. E. Bailey 1657

The Monod Equation: A Revisit and a Generalization of Product Inhibition Situations
O. Levenspiel 1671

Energy Requirements and Process Design Considerations in Compression-Milling Pretreatment of Cellulosic Wastes for Enzymatic Hydrolysis
T. Tassinari, C. Macy, L. Spano, and D. D. Y. Ryu 1689

Fermentation of *Bacillus thuringiensis* for Exotoxin Production: Process Analysis Study
A. Holmberg, R. Sievänen, and G. Carlberg 1707

Ultraviolet-Sensitive Photographic Process Using Enzymes
K. N. Kuan, Y. Y. Lee, and P. Melius 1725

Ethanol Production in an Immobilized-Cell Reactor
O. C. Sitton and J. L. Gaddy 1735

Communications to the Editor

Energy Requirements for the Vacuferm Process
B. Maiorella and C. R. Wilke 1749

Use of Immobilized Glucoamylase–β-Amylase and Glucoamylase–Fungal Amylase Mixtures to Produce High-Maltose Syrups
C. G. Bohnenkamp and P. J. Reilly 1753

Criteria for Multiple Steady States in Immobilized-Enzyme Systems
B. D. Kulkarni and P. A. Ramachandran 1759

Information for Contributors 1767

Issue No. 9, September

Immobilized Mitochondrial Electron Transport Particle for NADH Determination
M. M. Aizawa, M. Wada, S. Kato, and S. Suzuki 1769

Production of the Macrolide Antibiotic Tylosin in Batch and Chemostat Cultures
P. P. Gray and S. Bhuwapathanapun 1785

Kinetics of Biphasic Growth of Yeast in Continuous and Fed-Batch Cultures
K. Toda, I. Yabe, and T. Yamagata 1805

Partition of Hexadecane to the Cell Surface of *Candida tropicalis*: Mechanism for the Transport of Water-Insoluble Substrates
O. Käppeli and A. Fiechter 1829

Bed Expansion Characteristics of Liquid Fluidized Particles with Attached Microbial Growth
K.-F. Ngian and W. R. B. Martin 1843

Product Formation in the Continuous Culture of Microbial Populations Grown on Carbohydrates
C. I. Baskir and G. S. Hansford 1857

Oxygen Supply to Bacterial Suspensions of High Cell Densities by Hydrogen Peroxide
M. Ibrahim and H. G. Schlegel 1877

Efficiency of Bovine Liver Catalase as a Catalyst to Cleave H_2O_2 Added Continually to Buffer Solutions
M. Ibrahim and H. G. Schlegel 1895

Batch and Multistage Continuous Ethanol Fermentation of Cellulose Hydrolysate and Optimum Design of Fermentor by Graphical Analysis
R. D. Tyagi and T. K. Ghose 1907

Analysis of Microbial Growth and Product Formation with Nitrate as Nitrogen Source
L. E. Erickson 1929

Influence of Very Small Bubbles on the Dynamic k_LA Measurement in Viscous Gas–Liquid Systems
J. H. Heijnen, K. Van't Riet, and A. J. Wolthuis 1945

Production of High-Fructose Syrup by a Heat-Fixed *Lactobacillus* sp.
M. Bhatia and K. A. Prabhu 1957

Communications to the Editor

Carbon Dioxide Hold-Up as a Source of Error in Batch-Culture Calculations
A. A. Esener, N. W. F. Kossen, and J. A. Roels 1979

Useful Sparger Arrangement for Fermentations Involving Heavy Mycelial Suspensions
N. G. Karanth and A. C. Manchanda 1985

Information for Contributors 1987

Issue No. 10, October

Biotechnology Report: The Brazilian Ethanol Program
L. S. Pimentel 1989

Continuous Deacetylation of Cephalosporins
J. Konecny and M. Sieber 2013

A Quantitative Description of the Growth of *Saccharomyces cerevisiae* CBS 426 on a Mixed Substrate of Glucose and Ethanol
Th. G. E. Geurts, H. E. De Kok, and J. A. Roels 2031

Continuous Production of L-Alanine Using *Pseudomonas dacunhae* Immobilized with Carrageenan
K. Yamamoto, T. Tosa, and I. Chibata 2045

Modeling of Rotating Biological Contactor Systems
Y. C. Wu, E. D. Smith, and Y. T. Hung 2055

Application of Temperature-Sensitive Mutants for Single-Cell Protein Production
Y. Miyasaka, C. Rha, and A. J. Sinskey 2065

Substrate Utilization Kinetic Model for Biological Treatment Processes
Y. R. Chen and A. G. Hashimoto 2081

Batch- and Continuous-Culture Studies of a Methane-Utilizing Mixed Culture
S. C. Lamb and J. C. Garver 2097

Interspecific Interactions in a Methane-Utilizing Mixed Culture
S. C. Lamb and J. C. Garver 2119

Production of Maltose and Maltotriose from Starch and Pullulan by an Immobilized Multienzyme of Pullulanase and β-Amylase
R. Ohba and S. Ueda 2137

Characteristics of Immobilized Invertase
H. Ooshima, M. Sakimoto, and Y. Harano 2155

Kinetic Study of Thermal Stability of Immobilized Invertase
H. Ooshima, M. Sakimoto, and Y. Harano 2169

Continuous Conversion of Sucrose to Fructose and Gluconic Acid by Immobilized Yeast Cell Multienzyme Complex
S. F. D'Souza and G. B. Nadkarni 2179

Immobilized Catalase-Containing Yeast Cells: Preparation and Enzymatic Properties
S. F. D'Souza and G. B. Nadkarni 2191

Issue No. 11, November

Human Antibody Immunosorption of Hepatitis B Surface Antigen from Blood and Plasma
P. D. W. Areson, S. E. Charm, and B. L. Wong 2207

Effects of Controlled Gas Environments in Solid-Substrate Fermentations of Rice
R. Bajracharya and R. E. Mudgett 2219

Increased Production of Cellulase of *Tricoderma* sp. by pH Cycling and Temperature Profiling
S. N. Mukhopadhyay and R. K. Malik 2237

Preparation and Characterization of Enzymes Immobilized by Graft Copolymerization to Different Polysaccharides
L. D'Angiuro, P. Cremonesi, G. Mazzola, B. Focher, and G. Vecchio ... 2251

Utilization of the White-Rot Fungus *Sporotrichum pulverulentum* for Water Purification and Protein Production on Mixed Lignocellulosic Wastewaters
M. Ek and K.-E. Eriksson 2273

Nutritional Evaluation of the White-Rot Fungus *Sporotrichum pulverulentum* as a Feedstuff to Rats, Pigs, and Sheep
S. Thomke, M. Rundgren, and S. Eriksson 2285

Kinetic Studies of Cellodextrins Hydrolyses by Exocellulase from *Trichoderma reesei*
T-A. Hsu, C-S. Gong, and G. T. Tsao 2305

Extracellular Microbial Polysaccharides: Kinetics of *Pseudomonas* sp., *Azotobacter vinelandii*, and *Aureobasidium pullulans* Batch Fermentations
J. Klimek and D. F. Ollis 2321

Model of Steady-State-Biofilm Kinetics
B. E. Rittmann and P. L. McCarty 2343

Evaluation of Steady-State-Biofilm Kinetics
B. E. Rittmann and P. L. McCarty 2359

Inhibition of Alcoholic Fermentation by Substrate and Ethanol
G. Moulin, H. Boze, and P. Galzy 2375

Modified Kit Procedure for the Kinetic Assay of Ethanol
W. D. Bostick and J. B. Overton 2383

Communications to the Editor

Alcoholic Fermentation in an Aqueous Two-Phase System
I. Kuhn 2393

Power Dissipation and Heat Production in Bubble Columns: Approach Based on Nonequilibrium Thermodynamics
J. A. Roels and J. J. Heijnen 2399

Use of the Haldane Equation for Steady-State Substrate Inhibition in Biodegradation Kinetics
P. Beltrame, P. L. Beltrame, and P. Carniti 2405

Steam-Sterilizable pCO_2 Electrode
E. Puhar, A. Einsele, H. Bühler, and W. Ingold 2411

Convenient Method of Preparing Microbial Cells for Bomb Calorimetry
E. H. Battley and G. DiBiase 2417

Preparation and Properties of an Insolubilized Phosphotransferase
J. I. Ademola and D. W. Hutchinson 2419

Production of Fuel Ethanol by Solid-Phase Fermentation
K. D. Kirby and C. J. Mardon 2425

Use of 2-Deoxyglucose in the Selective Isolation of Mutants of *Trichoderma reesei* with Enhanced β-Glucosidase Production
M. Beja da Costa and N. Van Uden 2429

Simple Device for Level Control with Subsurface Drawoff in Chemostats
B. Koopman, A. O. Lau, P. F. Strom, and D. Jenkins 2433

Hydroxylamine as a Competitive Inhibitor for the Kinetic Enzymatic Assay of Ethanol in Relatively Concentrated Solutions
W. D. Bostick and C. A. Burtis 2437

Immobilization of β-Glucuronidase on Inorganic Supports
C. Clifford and D. B. Johnson 2441

Potential Health Hazard in Cellulose Bioconversions by Thermophilic Actinomycetes
F. J. Stutzenberger and M. W. Bowden 2443

Properties of Trypsin Immobilized on Sand
R. Puvanakrishnan and S. M. Bose 2449

Comments on the Influence of Diffusive Effects on the Lineweaver–Burk Plot
I. A. Webster 2455

Issue No. 12, December

Bioengineering Report: Application of Macroscopic Principles to Microbial Metabolism
J. A. Roels **2457**

Oxidation of D-Glucose in the Presence of Glucose Oxidase and Catalase
V. Linek, P. Beneš, J. Sinkule, O. Holeček, and V. Malý **2515**

Growth Yield from Electrons Available from Substrates in Aerobic- and Photoheterotrophic Cultures of *Rhodopseudomonas sphaeroides* S
K. Sasaki, Y. Nishizawa, and S. Nagai **2529**

Morphological and Ultrastructural Study of the Cell Envelope of Thermophilic and Acidophilic Microorganisms as Compared to *Thiobacillus ferooxidans*
V. K. Berry and L. E. Murr **2543**

Dynamics of Commensalistic Systems with Self- and Cross-Inhibition
M. Sheintuch 2557

Design of a Fast Flow Reactor for Aerobic Treatment of Dilute Waste Streams
B. Kristiansen and J. D. Bu'lock 2579

Relationship between Phosphate Stress, Effluent Quality, and Observed Cell Yield in a Pure-Oxygen Activated-Sludge Plant
W. Verstraete and W. Vissers 2591

Some Observations on Immobilized Hydrogen-Producing Bacteria: Behavior of Hydrogen in Gel Membranes
T. Matsunaga, I. Karube, and S. Suzuki 2607

Microrecirculation Reactor System for Characterization of Immobilized Enzymes
J. B. Taylor and H. E. Swaisgood 2617

Kinetic Study of a Membrane Enzyme Reactor
H. Kitano, S. Yoshijima, S. Hotogi, and N. Ise 2633

Kinetic Study of a Hollow-Fiber Enzyme Reactor
H. Kitano, S. Yoshijima, and N. Ise 2643

Photochemical System for Regenerating NADPH from NADP with Use of Immobilized Chloroplasts
I. Karube, T. Otsuka, H. Kayano, T. Matsunaga, and S. Suzuki 2655

Author Index 2667

Subject Index 2677

In Appreciation 2683

Information for Contributors 2685

Volume Title Page i

Volume Contents iii